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DIRECTIONS FOR THE DESTRUCTION OF WOLVES AND COYOTES.

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The losses from the destruction of stock by wolves and coyotes in the western United States amount to millions of dollars annually and seem to be increasing rather than decreasing. Practical means of preventing these losses are urgently needed. The present circular, based on field work of the Biological Survey, aims to present briefly the best methods of hunting, trapping, and poisoning wolves and coyotes, of finding the dens and destroying the young, and of fencing to protect stock. By the methods given herein the numbers of wolves and coyotes may be rapidly diminished and the losses of stock thereby reduced to a minimum.^a

CAPTURE OF PUPS.

If the time of breeding, character of breeding grounds, and habits of wolves are known, the dens may be easily located and the pups secured. In this way more effectually and economically than any other, increase of wolves and coyotes may be prevented. The large size of the litters makes the method especially important, as wolves usually have six to ten pups and coyotes five to nine. It is now positively known that both wolves and coyotes pair for the breeding season, and that the males stay with the females and help feed and care for the pups during the summer.

TIME OF BREEDING.

Wolf pups are usually born from March 9 to April 15 and coyote pups a little later, usually in April and May. The pups remain in or

^a The subject is treated in greater detail in Bulletin No. 72 of the Forest Service, "Wolves in Relation to Stock, Game, and the National Forest Reserves," and in Farmers' Bulletin No. 226, "Coyotes in Relation to Stock Raising in the West," both prepared by the Biological Survey.

near the dens until 2 or 3 months old. The period of gestation with the wolf, as with the dog, is nine weeks. The rutting season for the wolf, therefore, would come in January and February; for the coyote in February and March.

LOCATION OF DENS.

In the western United States wolves breed mainly in valley and foothill country or in low mountains. For breeding dens they choose, if possible, natural cavities or washed-out hollows on south slopes of rocky or badland ridges. There is usually a high point not far from the den, where the old male stands guard during the day.

In the North good tracking snow usually lies on the ground during the early part of the breeding season, which renders the finding of dens particularly easy, but even on bare ground there is little difficulty in locating every wolf den. This may be done by simply riding along the crests of the ridges until the wolf tracks are found. The tracks once found, the direction of the den can often be told from the lay of the land. Near the den the tracks usually gather into well-worn trails that may be followed on bare ground as readily as on snow.

Coyotes make their dens in the same kinds of places as wolves, and also dig burrows or use old badger holes, slightly enlarged; so a spade is often necessary in getting out the young.

Ranchmen can not afford to let wolf or coyote pups grow up on or near their ranges when an hour's ride will often serve to locate the dens. The young pups of both wolves and coyotes are nearly black, but as they grow older the color fades to dull yellowish, and when about 3 months old a new light-gray coat is acquired.

TRAPPING.

For wolves the best No. 4 double spring trap with heavy welded or special wolf chain should be used. If the trap is to be fastened to a stationary object, the chain should have a swivel at each end. If to a drag, one swivel next to the trap is enough. Always use a drag if possible. The best is a stone of 30 or 40 pounds weight, to which the chain is securely wired. A long oval stone is best. A piece of telegraph wire or smooth fence wire 5 or 6 feet long should be passed around one end of the stone; then doubled through the trap ring; with a twist to hold the ring in the middle; then around the other end of the stone and back on the opposite side to connect with the first loop. If properly fastened, a jerk on the trap tends to draw together and tighten the loops, and the spring of the connecting wire prevents a sudden jar that might break trap or chain. If an oval stone is not

at hand, a triangular or square stone may be used by passing the wire over the three or four sides and securely connecting it above and below.

If no stones are to be had and it is necessary to stake the traps, twisted iron stakes that can be driven below the surface of the ground should be used. They should be of good iron straps, at least 18 inches long, three-fourths of an inch wide, and three-sixteenths of an inch thick, turned over at the top into a P-shaped loop to connect with the ring of the trap chain.

When possible, place the trap between two tufts of grass or weeds, so it can be readily approached from one side only. Bury the stone, chain, and trap out of sight, with the trap nearest to the runway where the wolves follow a trail or road, cross a narrow pass, or visit a carcass. The trap should be flush with the surface of the ground and the jaws and pan covered with a piece of paper, to keep the earth from clogging under the pan. Fine earth should then be sprinkled over the paper until all traces of trap and paper are concealed. The surface of the ground and surroundings should appear as nearly as possible undisturbed. The dust may be given a natural appearance by sprinkling it with water. Touching the ground or other objects with the hands, spitting near the trap, or in any way leaving a trace of human odors near by should be avoided. Old, well-scented gloves should be worn, and a little of the scent used for the traps should be rubbed on the shoe soles. A piece of old cowhide may be used to stand on and to pile the loose earth on while burying the drag and trap.

For coyotes use the best No. 3 double-spring trap, unless in a wolf country, where it is better to use a trap strong enough to hold a wolf. In setting the trap use the same method and bait as for wolves, but the traps may be staked or fastened to a stationary object with more safety.

USE OF SCENTS.

Success in trapping depends largely on the use of a scent that will attract wolves and coyotes to the traps and keep them tramping and pawing there until caught. Meat bait alone is of little use, and often, indeed, scares the animals away. Of the many scents and combinations tested the fetid bait has proved most successful.

Fetid bait.—Place half a pound of raw beef or venison in a wide-mouthed bottle and let it stand in a warm place (but not in the sun) for two to six weeks, or until it is thoroughly decayed and the odor has become as offensive as possible. When decomposition has reached the proper stage add a quart of sperm oil or any liquid animal oil. Lard oil may be used, but prairie-dog oil is better. Then add 1 ounce of tincture of Siberian musk, or Tonquin musk. If this can not be

procured, use in its place 1 ounce of dry, pulverized castoreum (beaver castor) or 1 ounce of the common musk sold for perfumery. Mix well and bottle securely until used.

After setting the trap apply the scent with a stick or straw or by pouring from the bottle to the grass, weeds, or ground on the side of the trap opposite that from which the wolf would naturally approach. Never put scent on the trap, as the first impulse of the wolf after sniffing the scent is to roll on it.

This bait is very attractive also to cattle and horses, which are sure to tramp over and paw out the traps if set where they can get at them.

POISONING.

No poison has as yet proved so effective as pure sulphate of strychnine, provided the proper dose is used. The most effective dose is 4 grains for wolves and 2 grains for coyotes. The common 3-grain gelatin capsules sold by druggists will hold, if well filled, 4 grains of strychnine and are better than the larger capsules. The regular 2-grain capsules should be used for coyotes. The capsules should be filled, securely capped, and every trace of the intensely bitter drug wiped from the outside.

Each capsule should be inserted in a piece of beef suet the size of a walnut and the cavity securely closed, to keep out moisture. Lean meat should not be used, as the juice soon dissolves the gelatin of the capsule. The necessary number of poisoned baits may be prepared and carried in a tin can or pail. They should never be handled except with gloved hands or forceps. The baits may be dropped from horseback along a scented drag line made by dragging an old bone or piece of hide well saturated with the fetid scent, or they may be placed around or partly under any carcass on which the wolves or coyotes are feeding, or along trails which they are in the habit of following.

Gelatin capsules quickly dissolve in the juices of the stomach. Strychnine taken on an empty stomach sometimes kills in a very few minutes, but on a full stomach its action is much slower, and the animal may have time to travel a considerable distance.

HUNTING WITH HORSES.

Running wolves with horses is an expensive method of capture, though occasionally successful. With coyotes it is more common and more generally successful, and in either case affords thrilling sport.

HUNTING WITH DOGS.

Hunting wolves with dogs is usually unsuccessful, as few dogs have ever proved able to kill or hold a wolf. Ordinary trail hounds are

said to drive them out of a region, but the relief is only temporary, as they soon return. Such dogs can not catch wolves, and the wolves often turn and kill a number of the pack. Coyotes, on the other hand, are readily caught and killed by large greyhounds or wolfhounds, which run by sight only.

SHOOTING.

Hunters occasionally make a successful shot at a wolf and more often at a coyote, but generally hunting does not pay. However, by watching near the dens in the early morning or at dusk before the young are taken out a good hunter is sometimes able to shoot one or both of the parents.

WOLF AND COYOTE PROOF FENCES.

Under present conditions it is entirely impracticable to fence any great part of the western stock range against wolves and coyotes, but in many cases limited areas may be fenced to advantage. In sections where cattle are fed during the winter months, wolves often kill them on the open feeding grounds. These, as well as small home pastures, for both cattle and sheep, could be inclosed with wolf and coyote proof fences at relatively slight cost, often less than the value of the stock killed during one season. Preliminary tests of fences have been made by the Biological Survey, and until more thorough tests can be carried out the following is recommended as affording protection against both wolves and coyotes. Further experiments will probably show that a more economical fence can be constructed.

On posts 7 feet long, set a rod or a rod and a half apart, should be stretched one closely barbed wire along the surface of the ground. Three inches above this should be set a 36-inch strip of woven-wire fence of not over 5-inch mesh, and above this two barbed wires 6 inches apart. In the North another wire, 8 inches above these, may be added to provide for a moderate depth of snow, making a close fence practically 5 feet high. To prevent the wires from sagging away from each other, a vertical wire may be wrapped about each, at intervals of 8 feet, by a hand machine.

A fair grade of suitable 36-inch woven wire may be bought at an initial cost of 25 to 35 cents a rod, and barbed wires from 3 to 5 cents per rod each. The actual cost of fence, made as directed, can be computed only for localities where the cost of barbed wire, posts, and labor is known, but usually need not exceed 50 to 75 cents per rod for materials.

PRESERVATION OF SKINS.

Prime wolf skins in fall and winter, if properly handled, are worth from \$4 to \$6, and coyotes \$2 to \$3 each, for robes or rugs. For either

purpose the skin should be complete, with feet, ears, and nose perfect. The feet should be split through the soles, all bones removed except the terminal segment of each toe, and the skin opened out to dry. The ears should be partly skinned, the thick base of cartilage removed, and salt forced in between the skin and cartilage. The tail bone should be removed and the tail split along the lower side to the tip. The skin should be nailed up as nearly square as possible, with the legs wide and short, and left to dry in the shade. Many skins are spoiled by drying in the sun or by imperfect skinning.

Museums and taxidermists will often buy wolf skulls at 50 cents each if the bones are uninjured and the brains scooped out and enough of the flesh removed, so they will dry without becoming offensive. For museums they should be labeled for sex, locality, and date.

Occasionally wolf bounties are paid on coyotes because county officials can not distinguish between a large coyote and a small wolf, and in certain localities the distinction is exceedingly difficult. In doubtful cases the Biological Survey will be glad to identify the animals.^a

Approved:

JAMES WILSON,

Secretary of Agriculture.

WASHINGTON, D. C., *March 8, 1907.*

^a Skulls for identification should be addressed: Biological Survey, United States Department of Agriculture, Washington, D. C.- Each skull should be marked for date, sex, and locality. The name and address of sender should be plainly written.

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